A Survey on Deep Semi-Supervised Learning

Year: 2021 | Citations: 729 | Authors: Xiangli Yang, Zixing Song, Irwin King, Zenglin Xu

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Abstract

Deep semi-supervised learning is a fast-growing field with a range of practical applications. This paper provides a comprehensive survey on both fundamentals and recent advances in deep semi-supervised learning methods from perspectives of model design and unsupervised loss functions. We first present a taxonomy for deep semi-supervised learning that categorizes existing methods, including deep generative methods, consistency regularization methods, graph-based methods, pseudo-labeling methods, and hybrid methods. Then we provide a comprehensive review of 60 representative methods and offer a detailed comparison of these methods in terms of the type of losses, architecture differences, and test performance results. In addition to the progress in the past few years, we further discuss some shortcomings of existing methods and provide some tentative heuristic solutions for solving these open problems.